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NEW AFRICAN CULICINE MOSQUITOES (DIPTERA, CULICIDAE)

By F. W. Edwards, M.A., Sc.D., F.R.E.S.

(*British Museum, Natural History.*)

During the preparation of the section on Culicini for the monograph of Ethiopian Mosquitoes, shortly to be published by the Trustees of the British Museum, it has been ascertained that a number of species has escaped definition. Diagnoses of these species are given here; illustrations and some further details will be published in the monograph. The types of the new species except in one case are in the British Museum.

1. *Aëdes* (*Aëdimorphus*) *punctothoracis* and its allies.

These species are all characterised by the possession of four small silvery spots on the mesonotum, composed mainly or entirely of broad, flat scales, and by the dark tarsi and the absence of pre-apical silvery spots on the anterior surface of the middle and hind femora. Hitherto all specimens showing these characters have been determined as *A. punctothoracis*, but it now appears that at least seven distinct species have been confused under this name.

Aëdes punctothoracis Theo.

Scales on vertex all broad and flat. Torus without scales. Proboscis dark. Male palpi slightly longer than proboscis, last two segments densely hairy. Female palpi all dark. No white scales on front margin of scutum between the shoulder-spots, on angle of scutum, or on posterior third in front of scutellum. Hind tibia with a large white spot at tip; hind femur pale anteriorly on its lower half or more. Hypopygium: style with slender stem and large head, bearing a small horn with adjacent spine and a small leaf.

Coast of West Africa only: Gold Coast, Nigeria, Congo.

Aëdes hopkinsi sp. n.

Differs from *A. punctothoracis* as follows:—Scutum with a small additional pair of white spots, composed of narrow scales, on posterior third; some flat white scales around antescutellar bare space and above wing-base. Hypopygium: Coxite with a peculiar membranous basal lobe; style bearing a large leaf, spine distant from the horn.

Uganda: Lira, 2 ♂♂, including type; Kampala, 5 ♂♂; Entebbe, 3 ♂♂ (*Hopkins*).

Aëdes mixtus sp. n.

Very similar externally to *A. punctothoracis*. In some specimens (not in all) the posterior pair of scutal spots include some narrow scales. Hypopygium: style with differently shaped head, spine removed from horn; bristling of coxite different (no membranous basal lobe).

Gold Coast: Kumasi, 2 ♂♂, including type (*Watt*). S. Rhodesia: Salisbury, 1 ♂ (*Marshall*).

Aëdes microstictus sp. n.

Differs from *A. punctothoracis* as follows :—Palpi of ♂ much less hairy and scarcely longer than proboscis. White spot at tip of hind tibia small. Hypopygium : style much broader, with short, thick horn; coxite broader.

TRANSVAAL : Pretoria, 1 ♂.

Aëdes mutilus sp. n.

Differs from *A. punctothoracis* as follows :—Narrow scales of nape extending forwards on vertex nearly to eyes. Scutum more reddish-tinged; scales smaller than usual; some narrow creamy scales on front margin in middle. Hypopygium : Style differently formed, without horn; bristling of coxite different.

UGANDA : Mpanga Forest, series including type ♂ and ♀ (*Shillito*); Kampala (*Hopkins*).

Aëdes insolens sp. n.

Differs from *A. punctothoracis* as follows :—Proboscis pale beneath. Torus with a patch of silvery scales. Areas of white scales at eye-margins more spot-like. Palpi of ♀ white-tipped. Scutum with an extra pair of spots as in *A. hopkinsi*; some white scales on front margin in middle and around antescutellar spaces. Scattered white scales on mid femur and hind tibia.

UGANDA : Arua, 1 ♀ (*Hopkins*).

Aëdes bedfordi sp. n.

Resembles *A. hopkinsi*, but with more numerous flat white scales on scutum, such scales being present on anterior margin and on lateral angles. Hind femur more extensively white anteriorly, with a dark dorsal line.

ZULULAND : Ntambanana, 2 ♀♀, including type (*Bedford*).

2. *Aëdes* (*Aëdimorphus*) *domesticus* and its allies.

Aëdes domesticus has been considered to be a distinct and isolated species characterised essentially by the possession of a pair of silvery shoulder-spots and a preapical white spot on the hind femora. It now appears that three distinct species have been confused here.

Aëdes domesticus Theo.

The type female has large shoulder-spots and a large white spot at the tip of the hind tibia. Males with these characters have been found to belong to two distinct species according to the structure of the hypopygium. In the commonest form, which may be regarded as the true *A. domesticus*, the style is very broad, with decumbent horn and small leaf; basal lobe of coxite with a short apical hair.

SIERRA LEONE. GOLD COAST. S. NIGERIA. CONGO. UGANDA.

Aëdes longiseta sp. n.

Appears to differ from *A. domesticus* almost solely in the hypopygium : style not broadened, with erect horn and large leaf; basal lobe with very long apical hair.

CONGO : Stanleyville, 1 ♂ (*Schwetz*).

Aëdes leptolabis sp. n.

Shoulder-spots and spot at tip of hind tibia rather smaller than in *A. domesticus*. Style slender, with small head, a short horn and two short spines in addition to the small leaf; basal lobe of coxite with two short apical hairs.

Uganda: Nabadzidza, 3 ♂♂, including type (*Hopkins*). Belgian Congo: Postié, Katanga, 1 ♂, 6 ♀♀ (*Schwetz*); Leopoldville, 1 ♂ (*Henrard*); Kinshasha, 1 ♂ (*Duren*).

3. Two new species of the *vexans* group of the subgenus *Aëdimorphus*.

Aëdes pachyurus sp. n.

Type badly denuded through having been preserved in spirit, but the remaining scales indicate that the tarsi were probably entirely dark as in *A. dentatus* Theo. Hypopygium stouter than in other members of the *vexans* group; coxite with a dense patch of long hair sternally towards tip; style of rather distinctive shape, the attenuated tip longer than in related species.

S. Africa: Kaaimans Gat, Cape Province, iv.1933, 1 ♂ (*H. G. Wood*). This specimen is just possibly the male of *A. bevisi* Edw.

Aëdes subdentatus sp. n.

Much resembling and in various ways intermediate between *A. quasiunivittatus*, *A. dentatus* and *A. caliginosus*; scaling and coloration as in the first named, but hind claws toothed, as in *A. dentatus*. Hypopygium almost as in *A. caliginosus* but lobes of tergite less prominent and basal lobe of coxite larger and differently shaped.

Cape Province: Grahamstown (*Barraud*), type ♂ and 4 ♀♀. The specimens were at first determined as *A. bevisi* but the proboscis and tarsi are entirely dark.

4. Some species and varieties of the subgenus *Banksinella*.

The subgenus *Banksinella* was last reviewed by me in 1915, seven Ethiopian species being then recognised. It now appears that this number must be considerably augmented; Theobald's varieties *circumluteola* and *albothorax*, and perhaps also *pallida* are better treated as of specific rank, all belonging to a group, chiefly east African in distribution, in which the abdomen is distinctly banded; in the other group of the subgenus, which is entirely west African and has the abdomen unbanded, several new forms have recently come to light.

Aëdes palpalis Newstead.

Carter in 1913 redescribed and figured the type of this species (from the Congo) and mentioned a slightly different form occurring in Ashanti. The two forms seem to be at least varietally distinct, as indicated below. Another form which may be either a variety of *palpalis* or a distinct species is that of which the larva was recorded by Wigglesworth as *A. punctocostalis*, the single female having been so identified by me on account of the yellow spot on the costa.

A. p. var. *palpalis* Newst. (typical form).

Hind tibia all dark except at tip. Costa dark. Hypopygium with 5–7 spines on inner border of coxite distally.

Congo (*Newstead*). Uganda (*Hopkins*).

A. p. var. **carteri** var. n.

Hind tibia with a yellow patch in middle above. Costa dark. Hypopygium with 3–4 larger spines on inner border of coxite distally.

Nigeria: Lagos (*Philip, Wigglesworth*), short series including type ♂. Liberia: Gbonga (*Bequaert*). Gold Coast: Broomassie (recorded by Carter).

A. p. var. **maculicosta** var. n.

Hind tibia with a yellow patch in middle above. Costa with numerous scattered yellow scales on basal half and a short yellow area beyond middle which does not extend on to the first vein as in *A. punctocostalis*; this form also differs from *punctocostalis* in colouring of hind legs and scaling of pleurae.

Nigeria: Lagos (*Wigglesworth*); 1 ♀ reared from larva at same time as specimens of var. *carteri* were reared from pupae.

Aëdes monotrichus sp. n.

Very similar to *A. taeniarostris* or *A. palpalis* var. *carteri*, differing chiefly in ♂ hypopygium: style slender, not at all widened in middle, with only a moderately long terminal spine and no hairs; coxite without conspicuous hair-tufts, the small terminal projection carrying a single curved bristly hair instead of about 8–20 fine hairs as in the other species.

Nigeria: Lagos (*Philip*), ♂♀; Onitsha (*Wigglesworth*), type ♂.

Aëdes pogonurus sp. n.

Very similar to *A. taeniarostris, palpalis* var. *carteri*, or *monotrichus*, but hypopygium strikingly different: coxite with dense tufts of long hair both above and below; style with a tuft of hair somewhat as in *A. palpalis*, but differently shaped; no spines on inner margin of coxite; sternite large.

Belgian Congo: Stanleyville (*Schwetz*), type ♂. Females taken at the same place by Dr. Mouchet may belong either to this species or to one of the others mentioned.

Aëdes bolensis sp. n.

Resembles the other West African species in its unbanded abdomen, but differs in having the first vein yellow-scaled almost to the tip and almost all the mesonotal scales yellow (including those in the median area which are usually dark). Hypopygium almost as in *A. lineatipennis*. Hind tibiae all dark.

Gold Coast: Bole (*Ingram*), type ♂.

5. The *chrysogaster* and *inornatus* groups of *Eretmapodites*.

Many years ago I distinguished three forms of *Eretmapodites chrysogaster* Graham, differing in small characters of the hypopygia and hind tarsi of the males—the typical form, var. *semisimplicipes* and var. *subsimplicipes*; I further expressed doubt as to whether *E. grahami* Edw., should not be regarded as another variety of *E. chrysogaster*. A restudy of the more abundant material now available indicates not only that these four forms should more correctly be treated as distinct species, but that two closely allied species have been confused under the supposedly typical *E. chrysogaster*. Further, it now appears that four allied species have been confused under the name *E. inornatus* Newst.

One of the striking peculiarities of the hypopygium of the genus *Eretmapodites* is the possession of two pairs of movable appendages arising from the membrane at the base of the coxites; these appendages, which are distinct from the various lobes of the coxites, may be termed the proximal (or outer) and distal (or inner) claspettes; they provide good specific differences between most of the species.

Eretmapodites intermedius sp. n.

Differs from *E. chrysogaster* as follows :—Distal claspette densely hairy all over instead of only at tip; proximal claspette with longer and denser hairs.

Belgian Congo : Stanleyville (*Schwetz*), series including type. Uganda : Mpumu (*Fraser*). Tanganyika : Dar-es-Salaam (*McHardy*).

Eretmapodites inornatus Newst.

A paratype ♂ shows the following features :—Proximal claspettes rudimentary, bare, pointed. Distal claspettes straight, rather stout. Apical lobe scarcely half length of coxite, bearing peculiar long-stalked spatulate scales as in other species of this group. Basal lobe much larger than apical lobe, bearing a dense patch of modified scales. No scale-tuft on coxite (apart from those on lobes).

Eretmapodites forcipulatus sp. n.

Differs from *E. inornatus* as follows :—Distal claspettes longer, stouter, sharply bent near the enlarged tip. Basal lobes with comparatively few modified scales.

Gold Coast : Sunyani (*Ingram*), type ♂ ♀. Liberia : Memeh (*Bequaert*).

Eretmapodites melanopus Graham.

The type ♂ is unfortunately lost, but a ♂ in the British Museum from Ilesha, S. Nigeria, may belong to Graham's species. This shows the following features :—Proximal claspettes long, stout, with a tuft of modified scales at tip; distal claspettes shorter than proximal pair, straight, pointed, with a few simple hairs at tip. Apical lobe extending almost whole length of coxite, basal lobe smaller. Coxite without scale-tuft apart from those on lobes. Style thickened in middle (thus differing from the other three species).

Eretmapodites argyrurus sp. n.

Differs from the above three species in having a complete silver band on the seventh tergite. Hypopygium resembling that of *E. melanopus* (as determined above), but style not thickened in middle; coxite with an interno-dorsal tuft of dark lanceolate scales; proximal claspette rather longer, with bent hairs at tip.

Nigeria : Lagos (*Connal*).

6. Further new species and varieties.

Megarhinus evansae sp. n.

Resembles *M. brevipalpis*, but smaller; mesonotum with a broad border of blue scales, only the central portion being green; long lateral hairs of tergite 8 black like those of tergite 7, instead of yellow. Front tarsi completely dark in both sexes.

Sierra Leone : Freetown (*Evans*, type ♀; *Wigglesworth*, allotype ♂).

Uranotaenia bilineata Theo. var. **obsoleta** var. n.

Differs from the typical form as follows :—Abdominal segments 4–7 with basal creamy bands. Hind tibiae and tarsi with the pale markings only very faintly indicated, scarcely lighter than the ground-colour.

Uganda : Kasakiro (*E. G. Gibbins*).

Uranotaenia chorleyi sp. n.

Very similar to *U. neireti* Edw. (of Madagascar), differing as follows :—Head with a broad and continuous band of blue scales in front. Pleurae almost uniformly pale. Posterior pronotal lobes not darkened below. Hind tarsi entirely dark.

Uganda : Kasala Forest (*Fraser*), series including type. Belgian Congo : Stanleyville (*Schwetz*).

These specimens have been previously referred to as *U. fusca* Theo. or *U. neireti* Edw., but re-examination of the types shows that they represent a distinct species, which is here named in honour of Mr. T. W. Chorley, of the Agricultural Laboratory, Kampala, who has taken a great interest in the progress of mosquito survey work and rendered valuable assistance.

Uranotaenia ornata Theo. var. **musarum** var. n.

Differs from typical *U. ornata* as follows :—Flat scales of head nearly all yellowish. Tori rather light brownish. Abdomen with narrow but complete basal whitish bands on tergites 3–7 or 4–7.

Uganda : Mpumu (*Fraser*); Fort Portal (*Shillito*), type reared from axils of leaves of wild banana.

Ficalbia (Mimomyia) femorata sp. n.

Very similar to *F. pallida* Edw., differing chiefly as follows :—Head with the flat scales rather dark brownish. Mesonotum with a diffuse patch of blackish scales in front. All femora (instead of only the middle pair) with anterior surface almost entirely black-scaled (thus differing conspicuously from all other African species of the subgenus). Middle tibiae not distinctly pale posteriorly.

Uganda : Kibanga, 3.ix.1910, 1 ♀ (*Fraser*).

Ficalbia (Mimomyia) flavopicta sp. n.

Very distinct from all other African species of the subgenus by the following combination of characters :—Scales on vertex narrow (as in *F. mimomyiaformis* and *plumosa*). Scales of scutum largely dark brown but with a rather broad yellow border suggestive of *Aëdes* (*Banksinella*). Abdomen with broad yellow ∧-shaped basal bands on tergites 2–7. First four segments of all tarsi with narrow white basal rings, fifth hind tarsal segment all white. First vein with creamy-yellow scales on its basal third.

Kenya : Kisumu (*Symes*).

Taeniorhynchus (Coquillettidia) flavocinctus sp. n.

Much resembles *T. nigrithorax* Theo., notably in the shining blackish thorax and yellow abdomen but differs in having the front and middle tibiae less uniformly dark; hind tibia with a yellow ring beyond middle instead of all black; abdomen with a variable number of black scales.

Belgian Congo : Lubumbashi (series including type), Kabunda, Futwe and Mwabo (*Seydel*); Elisabethville (*Schwetz*).

Taeniorhynchus (Coquillettidia) wahlbergi sp. n.

Closely resembles *T.* (*C.*) *aureus* Edw., differing chiefly in form of ♂ style : membranous expansion less hairy and much nearer tip of style, with only a small beak-like projection beyond it.

S. AFRICA : " Caffraria " (*Wahlberg*); type ♂ in Stockholm, paratype ♂ in British Museum.

Aëdes (Stegomyia) contiguus sp. n.

Closely related to *A.* (*S.*) *poweri* Theo., differing as follows :— Median yellow line of scutum forking in front of scutellum; middle tibia uniformly black, without the white patch at base which is present in the type of *poweri*; second segment of middle tarsi black all round on distal half or more. Resembles *A. poweri* and differs from *A. calceatus* Edw. and similar species in the much smaller white marks at tips of middle and hind femora. Lobes of ninth tergite of ♂ contiguous.

S. RHODESIA : Salisbury, type ♂ (*Marshall*). TRANSVAAL : Johannesburg (*de Meillon*).

Aëdes (Stegomyia) deboeri Edw. var. **demeilloni** var. n.

Differs from typical *A. deboeri* as follows :—Middle tarsi with second segment more extensively white above. Hind tibia with the white mark at base smaller. Hind tarsi with the fifth segment as well as fourth practically all white.

ZULULAND : Eshowe (*Ingram, de Meillon, Turner*). Some of the specimens had been determined as *A.* (*S.*) *pseudonigeria* Theo., and the larva was described by Ingram and de Meillon under that name.

Aëdes (Diceromyia) taylori sp. n.

Resembles *A.* (*D.*) *furcifer* Edw. and *A.* (*D.*) *adersi* Edw., and somewhat intermediate between the two. Resembles *furcifer* and differs from *adersi* in having a distinct pale ring on the proboscis, but differs from *furcifer* in having no scattered pale scales on the dark parts of the abdomen. Hypopygium differing from *furcifer* in lacking the hair-pencil at tip of coxite and from *adersi* in form of style.

NIGERIA : Gadau, series including types (*A. W. Taylor*). TANGANYIKA : Dar-es-Salaam (*Haworth*).

DESCRIPTION OF A NEW GENUS OF AMERICAN HESPERIIDAE (LEPIDOPTERA)

By Brigadier W. H. EVANS, C.S.I., C.I.E., D.S.O., F.R.E.S.

MR. FRANCIS HEMMING (1935, *Trans. R. ent. Soc.* **83** : 436) has pointed out that Scudder (1875, *Proc. Amer. Ac. Arts Sci. Boston* **10** : 145) was incorrect in selecting the American Hesperiid *Papilio dubius* Stoll as the type of *Coeliades* Hübner, and has assigned as the type thereof *Papilio forestan* Stoll, an African Hesperiid. A new genus is required, therefore, for *Papilio dubius* Stoll, 1782, and I propose the name **Dubiella** gen. n., an adequate description of which was published by Godman and Salvin (1893, *Biol. centr. Amer. Lep.—Rhop.* **2** : 591) under the name *Coeliades* Hübner.

THE TYPE OF THE GENUS *ACTINOTE* HÜBNER, [1819] (LEP. NYMPHALIDAE)—A CASE FOR CONSIDERATION BY THE INTERNATIONAL COMMISSION ON ZOOLOGICAL NOMENCLATURE

By Francis Hemming, C.B.E., F.R.E.S.

Hübner ([1819], *Verz. bekannt. Schmett* (2) : 27) founded the genus *Actinote* Hübner for four species which he cited as follows :—

209. *Actinote Thalia* Linn. Syst. Pep. [*sic*] 67. Cram. 246. A.
210. *A. Epaea* Cram. 230. B.C.
211. *A. Eurita* Cram. 233. A.B.
212. *A. Amesis* Cram. 104. f.

Scudder (1875, *Proc. Acad. Arts Sci., Boston* **10** : 102) designated the third of these species, *Papilio eurita* Cramer, as the type. It is necessary in the first instance to determine the identity of the species so named by Cramer. An examination both of Cramer's published plate and of the original drawings for that plate now in the British Museum (Natural History) show that Cramer figured two species under this name. Figure A on plate 233, which Cramer regarded as representing the ♂ of *Papilio eurita*, in fact represents a specimen of *Bematistes umbra* (Drury), ♀ for *fasciata* (Auriv.).* Figure B on the same plate, which Cramer regarded as representing the ♀ of *Papilio eurita* in fact represents a ♀ of *Bematistes macaria* (Fab.). *

It is clear from the text given by Cramer (1779, *Uitl. Kapellen* **3** (20) : 69, 70) that he did not regard himself as the author of the name *Papilio eurita*, for on the top of page 70 at the end of his account of this species he added the reference " Linn. Syst. Nat. pag. 757. n. 69. Pap. Helicon. Clerck, icon. Tab. 31 Fig. 7.8." This is the species first described as *Papilio Barbarus eurytus* by Linnaeus in 1758 (*Syst. Nat.* ed. **10** : 487 no. 180), which is the species known to-day as *Pseudacraea eurytus* (Linn.).

Having thus established the identity of the species described as *Papilio eurita* by Cramer, and of the two species figured by him under that name, it is necessary to determine which of them should be regarded as having been designated by Scudder as the type of *Actinote* Hübner. On a previous occasion (Hemming, 1934, *Gen. Names Hol. Butt.* **1** : 10), I argued that where " later authors have selected as the type of a genus a species which the original author had included in the genus but which he had misidentified and to which he had himself applied a wrong specific name," the correct course would be to accept as the type of the genus the species so misidentified and not the species to which the name used by the original author properly applies. If this argument were adopted, the type of *Actinote* Hübner would be one or other of the two species figured by Cramer as *Papilio eurita* [sic] Linn., and not the species to which in fact Linnaeus applied the name *Papilio Barbarus eurytus* in 1758.

The general principles underlying problems of this kind were discussed at one of the meetings of the International Commission on Zoological Nomenclature held at Lisbon in September, 1935, and as a result of those discussions, I was convinced that though the view set out above is still, in my view, the more

* Until recently these species were always referred to the genus *Planema* Doubleday. I have shown (Hemming, 1935, *Trans. R. ent. Soc. Lond.*, **83** : 435) that this use of the name is invalid and I have proposed the name *Bematistes* Hemming (*loc. cit.* **83** : 374) for these species.

logical, it is preferable in such cases to accept as the type of a genus the species to which the name used by its original author properly applies, even where the author of the genus intended, when using that name, to refer to a different species. This view, which was the unanimous view of the Commission, has the great advantage that it makes it impossible for any subsequent author to dispute the status of a genus by claiming that the species designated as the type in accordance with the rules in the Code is not the type, on the ground that, when citing the name of that species, the original author of the genus intended to refer to another species to which he incorrectly applied that name. The Commission realised that the strict application of the Code in this sense would in certain cases lead to results which could not be defended. To meet such cases, there is, however, the power granted to the Commission to suspend the rules where, in their judgment, their strict application would clearly result in greater confusion than uniformity. Acting in this spirit, the Commission at Lisbon suspended the rules in the case of eight generic names in the Rhopalocera (see paragraph 29 of their Report to the Congress), and declared in each case that the type of the genus concerned is the species intended by the original author of the genus and not the species to which the name used by him properly applies. This action by the Commission is in perfect conformity with the principle laid down in Opinion No. 65 published in March 1914.

In accordance with the view taken by the Commission at Lisbon, it is necessary to admit that Scudder's action in 1875 constitutes a designation under Article 30(11) (g) of *Papilio eurytus* Linn., as the type of *Actinote* Hübner. In other words *Pseudacraea* Westwood (1850, *in* Doubleday, *Gen. diurn. Lep.* (2) : 281) to which *Papilio eurytus* Linn., has hitherto been assigned, is a synonym of *Actinote* Hübner.

The position is, therefore, that if the rules were strictly applied in this case, the name *Actinote* Hübner, which has till now been used for a genus of the subfamily ACRAEINAE, would be transferred from that subfamily to the subfamily NYMPHALINAE, and would replace the name *Pseudacraea* Westwood, the species of which mimic those of the genus *Acraea* Fabricius the leading genus in the subfamily ACRAEINAE. It is hardly possible to imagine a case in which the strict application of the rules could lead to greater confusion than would arise if the name *Actinote* Hübner were transferred in this way.

All these difficulties could be avoided if the International Commission on Zoological Nomenclature were to cancel Scudder's designation of *Papilio eurita* Cramer as the type of *Actinote* Hübner, and were to declare its type to be *Papilio thalia* Linn., 1758, which is the first of the four species placed in this genus by Hübner, and which has ever since been assigned to that genus.

Mr. N. D. Riley and I propose to submit the case of *Actinote* Hübner as set out above to the International Commission on Zoological Nomenclature, and to recommend to that body :—

(*a*) that in virtue of the plenary powers conferred upon them by the International Zoological Congress, they should suspend the rules in the case of the generic name *Actinote* Hübner, [1819];

(*b*) that they should cancel the designation by Scudder in 1875 of *Papilio eurita* Cramer, 1779, (recte *Papilio eurytus* Linn., 1758) as the type of *Actinote* Hübner, [1819];

(*c*) that they should declare the type of *Actinote* Hübner, [1819] to be *Papilio thalia* Linn., 1758, (*Syst. Nat.* ed. **10** : 467); and

(*d*) that they should add *Actinote* Hübner, [1819] with the type designated in (*c*) above, to the Official List of Generic Names.

THE TAXONOMY OF THE PSOCOPTERA: PRELIMINARY SKETCH

By J. V. Pearman, F.R.E.S.

The scheme of classification propounded by Enderlein has for long been the generally accepted basis of all systematic work in the Psocoptera, but within recent years it has been challenged by other arrangements formulated by Karny and Banks respectively. The two newer systems are founded principally on venational characters; that of Enderlein also depends largely on venation, but considerable importance is attached to some other structural peculiarities, such as the number of tarsal and antennal segments, the presence or absence of maxillary and anal spurs, and the development of the prothorax. When, however, attention is directed to a wider range of morphological features, there are brought to notice some facts that are not explainable by reference to the existing taxonomies. Close anatomical resemblances are found to occur among genera that, on venational grounds, have been widely separated, as well as notable differences between genera that have been similarly brought together. A few instances may be adduced.

(1) *Deipnopsocus* and *Psoquilla* are ranged in separate sub-families by both Enderlein and Karny. In Banks's arrangement they would go, apparently, in different families. Yet in every respect except venation their structural make-up is almost identical.

(2) *Deipnopsocus* and *Tapinella*, contrarily, are set in close proximity by all three authors. *Tapinella* has, however, an entirely different organisation from *Deipnopsocus*, and actually shares a number of morphological peculiarities with genera of which *Liposcelis* is the best known.

(3) *Stenopsocus*, as Chapman has shown, has positive affinities with *Caecilius*. Both Enderlein and Banks place it in close relationship with *Psocus*, a genus that is admittedly not intimately allied to *Caecilius* (although Banks would include both in one superfamily). Karny puts it in a family distinct from those to which the two other genera are assigned.

(4) *Bertkauia* differs so little from *Epipsocus* that it may even have to be considered synonymous. Enderlein parts the two genera in separate sub-families; Karny allots them to different families.

These and other anomalies, as well as disagreements between the three systems themselves, suggest that venation, even when supplemented by other characters, is unsatisfactory as a basis for classification. For some years past I have been searching for morphological evidence of a more reliable nature, by examining and comparing the principal parts of the exo-skeleton (including the mouth-parts) in dissections. This inquiry has revealed that the skeletal organs occur in a comparatively limited number of distinctive forms (types) and that these type-forms are aggregated in certain definite correlations. The insects thus classify themselves, the general traits of the correlated parts characterising major groups, and particular modifications of the structural type-forms distinguishing minor groups.

A full account of the accumulated evidence, and of the revised classification educed therefrom, is nearing completion, but a considerable time must elapse before it can be published. Meanwhile, the number of workers in Psocidology is increasing, and it would seem desirable to indicate the means by which the taxonomic confusion may be lessened and the systematic study of the insects made more intelligible.

It is impossible in a brief outline sketch to give an adequate description of the several type-forms of the structural units or to diagnose the combinations in which they occur. Instead, the immediate necessities of the case are met by designating genera to typify each of the morphological segregations. Any species of a selected genus will exhibit in its general structural composition the features characteristic of its group, and will thus serve as a "reference model." In this connection, it should be emphasised that in making comparisons the whole of the external anatomy should be taken into account; this will involve some dissection, but the work cannot be shirked if a proper appreciation of the morphological factors is to be obtained.

As might be expected to result from evolutionary hazards, there is unequal differentiation between the morphologically separable assemblages, but there do not appear to be any demarcations sharp enough to justify sub-ordinal divisions. Primarily it is possible to recognise seven major groups with well-marked characteristics, and to these I would ascribe a status somewhat superior to that of a super-family. In addition, there are several smaller groups, of approximately family rank, that cannot be positively assigned to any of the first discerned main groups; with two of them, indeed, they do appear to have some affinities, yet they have certain distinctive features of their own. Differing also among themselves, they will probably be redistributed in the light of later knowledge; for the present, they have been brought together in a special group. Finally, a number of genera have been so inadequately described that their relationships cannot be even conjectured.

In the conspectus of the revised classification given below, family names in general use have been retained where applicable; for the superior groups, the names have been based either on those of the best known typical genera or on those of genera with the less specialised constitutions. The genera chosen as representative have been selected either because of their familiarity or because there exists in the literature some account of their morphology other than of the wings. In a number of cases where the original descriptions are defective, references to subsequent publications are given in the bibliographical list. Names within brackets are synonyms.

Tabular Summary of Revised Classification.

Group.	Family.	Typical Genera.
I. Atropetae.		
	1. Lepidopsocidae.	*Nepticulomima* Endln. 1906; *Lepidilla* Rib. 1905 (*Pteroxanium* End. 1922).
	2. Atropidae.	*Atropos* Leach 1915, Endln. 1905 (*Trogium* Endln. 1911, Illiger 1798 ?).
	3. Psoquillidae.	*Psoquilla* Hagen 1866; *Eosilla* Rib. 1908.
II. Nanopsocetae.		
	I. Liposcelidae.	*Liposcelis* Motsch. 1852 (*Troctes* Kolbe 1880, *nec* Burmeister 1839); *Embidopsocus* Hag. 1865 (*Stenotroctes* Endln. 1905).

	2. Pachytroctidae.	*Pachytroctes* End. 1905; *Nanopsocus* Pearm. 1928; *Peritroctes* Rib. 1911; *Tapinella* End. 1908, Pearm. 1932.
III. Psocatropetae.		
(*a*) Psocatropida.	1. Psocatropidae.	*Psyllipsocus* Selys 1872 (*Nymphopsocus* Endln. 1903) *Psocat(h)ropos* Rib. 1899; *Dorypteryx* Aar. 1884, Ribaga 1907.
(*b*) Scoliopsocida.	2. Scoliopsyllopsidae.	*Scoliopsyllopsis* End. 1912, Badonnel 1931.
IV. Amphientometae.		
	Amphientomidae.	*Seopsis* Endln. 1906; *Nephax* Pearm. 1935.
V. Epipsocetae.		
	Epipsocidae.	*Epipsocus* Hag. 1866; *Bertkauia* Kolbe 1882.
VI. Caecilietae.		
	1. Calopsocidae.	*Calopsocus* Hag. 1866, Endln. 1904.
	2. Caeciliidae.	*Caecilius* Curt. 1837.
	3. Amphipsocidae.	*Amphipsocus* McLach. 1872; *Harpezoneura* Endln. 1909.
	4. Stenopsocidae.	*Graphopsocus* Kolbe 1880.
	5. Polypsocidae.	*Polypsocus* Hag. 1866.
VII. Homilopsocidea.		
	1. Pterodelidae.	*Pterodela* Kolbe 1880 (*Lachesilla* Westwd. 1841).
	2. Peripsocidae.	*Peripsocus* Hag. 1866; *Ectopsocus* McLach. 1899.
	3. Hemipsocidae.	*Hemipsocus* Selys 1872.
	4. Pseudocaeciliidae.	*Pseudocaecilius* Endln. 1903 (*Hageniella* Endln. 1903).
	5. Trichopsocidae.	*Trichopsocus* Kolbe 1882.
	6. Archipsocidae.	*Archipsocus* Hag. 1882.
	7. Elipsocidae.	*Elipsocus* Hag. 1866; *Actenotarsus* Endln. 1907.
	8. Philotarsidae.	*Philotarsus* Kolbe 1880.
	9. Mesopsocidae.	*Mesopsocus* Kolbe 1880.
VIII. Psocetae.		
	1. Psocidae.	*Psocus* Latr. 1794, Pearm. 1932; *Psocidus* Pearm. 1934.
	2. Thyrsophoridae.	*Thyrsopsocus* Endln. 1900.
	3. Myopsocidae.	*Myopsocus* Hag. 1866.
IX. Psocida agnota.		
	(It is suggested that under this heading may be grouped temporarily genera that cannot be given a definite place owing to insufficient knowledge of their morphology, e.g. *Allopsocus* Banks 1920, *Psilopsocus* Endln. 1903.)	

There should be little difficulty in recognising the separate wholeness of groups I, II, IV, V, VI, and VIII. In each, among its own members, there is a noteworthy consistency in the build of the mouth-parts. Venation and female genitalia are subject to some modifications but are still conformable to type, most strictly so within the family, in which grade, also, tarsal segmentation and claw formation, with few exceptions, are likewise constant. The male genitalia are more varied, but rarely show a marked departure from the fundamental construction peculiar to the group.

In group III, although there may be noted some resemblances to group I (*e.g.* in parts of the mouth structures) and some to other groups (*e.g.* certain venational features), there is a distinctiveness in these and other respects (*e.g.* female genitalia *) that precludes intimate association with any other group. The genus *Scoliopsyllopsis* is placed here on account of some general resemblances, but Badonnel has shown that it has striking specialisations that give it an isolated position.

The family divisions in group VI are tentative; further study in this group is needed.

Among the families in group VII there is considerable structural diversity, and the inclusion of all within a single group is a provisional measure. In some features there are various degrees of resemblance to conditions in groups VI and VIII. However, from the former they are excluded by, inter alia, the different formation of the mouth-parts (which in several cases are similar to those of group VIII), and from the latter they stand apart by genitalic differences. By enlarging the scope of group VIII, it might be possible to include therein some of the families of group VII (*e.g.* 8 and 9, perhaps also 7 and 3), but although some regrouping will become necessary in the light of later knowledge, it is better not to disturb the present homogeneity of the Psocetae until an examination has been made of the morphology of numerous genera as yet uninvestigated.

The family PSOCIDAE is a large one, and I think that future study will show that its true connotation is that of a super-family, which might embrace also the THYRSOPHORIDAE.

A test of the naturalness of the foregoing classification may be made by referring to the biological histories of the insects. Considered broadly, Psocids can be ranged in three etho-biological categories in each of which a particular style of oviposition is characteristic; they may be summarised thus :—

A. Eggs sculptured; laid bare.
B. Eggs plain; overwebbed.
C. Eggs plain; overplastered.

Distribution of the morphological groups between the biological categories gives the following :—

A. I : III : VII–1.
B. VI : VII–2 (part).
C. II : IV : V : VII–2 (part), 3/9 : VIII.

This is suggestive, if no more, of the taxonomic arrangement outlined being, to a considerable extent, in conformity with " natural " groupings. When

* Male genitalia not known.

comparisons are made between smaller units, both biological and morphological, much stronger indications of corroboration are given.

Questions of phylogeny and the palaeontological evidence cannot be discussed here, but will be considered in the extended treatment of the whole subject.

Select Bibliography.

Literature relating to the genera named in the Tabular Summary may be traced through the *Zoological Record* for the years quoted. A short selection of other papers is added here, with brief indications of their special applicability; instead of the full titles, references are given, in brackets, to the years and numbers under which they are indexed in the *Zoological Record*.

Badonnel: 1. Various incl. *Psocatropos* (1931—114), 2. *Peripsocus*; *Scoliopsyllopsis* (1931—115), 3. *Caecilius*, *Liposcelis* (1932—100), 4. Genitalia (1932—102).
Banks: Classification (1930—126).
Chapman: Groups VI, VII part, VIII part (1930—441).
Enderlein: 1. Morphol., systematics (1903—452), 2. Most groups (1903—459), 3. Gps. I, II (1905—497), 4. Gps. I—1, IV (1906—21), 5. Classification (1911—681).
Karny: Classification (1931—1412).
Pearman: 1. Biological (1927—1971; 1928—1911), 2. *Psocus* (1932—2246), 3. Gps. VI, VIII (1934—2317), 4. Synonymy (1935, *Ent. Mon. Mag.*, **71**: 82).

TWO NEW SPECIES OF CERATOPOGONIDAE (DIPTERA) FROM THE WINGS OF DRAGONFLIES

By J. W. S. Macfie.

Communicated by Dr. F. W. Edwards, F.R.E.S.

A year or two ago (1932), when studying some species of Ceratopogonidae found on the wings of dragonflies in Java, Sumatra, New Guinea, the Moluccas, and West Africa, Dr. F. W. Edwards of the British Museum, London, drew my attention to the fact that Michelmore (1929) had recorded in his Introduction to the Diptera of Wicken Fen "the capture by Wicken Lode in August, 1926, of a specimen of the large dragonfly, *Aeschna grandis* L., carrying on its wings a number of minute black flies," an observation which suggested that similar Ceratopogonidae might occur also in Britain. Recently Mr. J. Cowley has actually procured two specimens of such insects at Wicken Fen, not indeed on the wings of *Aeschna grandis*, but on those of two other dragonflies, *Coenagrion pulchellum* Lind., and *Lestes dryas* Kirby. These specimens I have been privileged to examine thanks to the kindness of Dr. Edwards. Both belong to a hitherto undescribed species of *Pterobosca* allied to the New Guinea species for which I proposed the name *P. odonatiphila*. A description of the species is given below. It is perhaps of interest because apparently no species of the genus *Pterobosca* has previously been discovered in Europe.

Another new species of *Pterobosca* is also described. This insect was found by Mr. Cowley attached to a wing of a specimen of *Idionyx* which had been taken in Assam.

The unit used in the descriptions is approximately 3·7 μ. The types of the two new species described are preserved in the collection of the British Museum, London.

Pterobosca paludis sp. n.

A brown or dark brown species resembling *Pterobosca odonatiphila* Macfie, but having the basal segments of the antennae more flattened, disc-shaped, and the claws deeply cleft at their tips.

♀. Length of wing, about 1·2 mm.; greatest breadth, about 0·4 mm.

Head very dark brown. Eyes bare. Palpi dark or darkish brown: third segment not much inflated, furnished about middle or in distal half with shallow pit, fifth tapering; lengths of last three segments about 15, 8, and 10 units respectively. Antennae (fig. 1, *a*) dark brown: segments 3–9 flattened, disc-shaped, measuring in one specimen from 7 by 11 to 5 by 8 units; segments 10–15 elongate, 10–14 successively longer, from about 11 by 8 to 16 by 6·5 units, the last segment about 21 by 6·5 units, ending in a nipple-like process. The combined lengths of segments 3–9 and 10–15 about 37 and 88 units respectively. *Thorax* very dark brown above, well clothed with stiff, shortish, dark hairs. Scutellum and postscutellum very dark, the former bearing fairly numerous bristles and hairs, especially about middle. *Wings* unadorned, but veins enclosing radial cells somewhat infuscated. Macrotrichia numerous; no distinct bare areas along veins. No scales. Costa extending slightly beyond middle of wing. First radial cell obliterated; second well formed, much as in *P. odonatiphila*. Fork of *Cu* at about same level as base of second radial cell. Halteres with brown or dark brown knobs. *Legs* (fig. 1, *b–c*) brown or dark brown, but first 3–4 segments of tarsi paler than rest; well clothed with bristles and hairs, but without scales. T.R. about 3. Fourth tarsal segment not very small, about three-quarters length of fifth; fifth dark, not delicate. Claws curved, about half length of last tarsal segment, with deeply cleft tips. Empodium much as in *P. odonatiphila*.

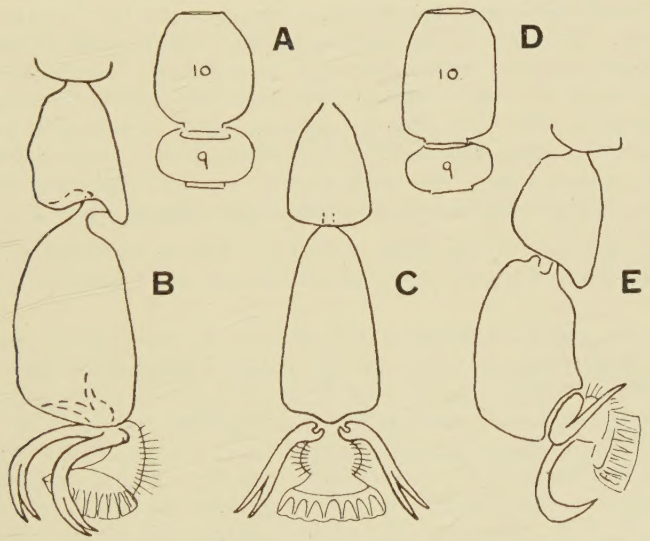

Fig. 1, *a–c*.—*Pterobosca paludis* sp. n.—*a*. segments nine and ten of antenna; *b*. and *c*. terminal segments of tarsi, and claws; *d–e*—*P. aërobates* sp. n.—*d*. segments nine and ten of antennae; *e*. terminal segments of tarsi, and claws.

Abdomen dark brown (including cerci), without scales. Spermathecae two, highly chitinised, oval, sub-equal, about 60 μ by 52 μ; the duct rather broad, chitinised for only a very short distance, 3 μ or less.

England : Harding's Piece, Wicken Fen, 2nd July, 1935, 2 ♀♀ (*J. Cowley*). The one specimen found attached to the base of the left hind-wing of a male *Coenagrion pulchellum* Lind., and the other found in the paper in which was enfolded a female *Lestes dryas* Kirby. The latter specimen is much paler in colour than the former, but both clearly belong to the same species.

This insect resembles in many respects *Pterobosca odonatiphila* Macfie, a species found on the wings of dragonflies in New Guinea, but differs in having the basal segments of the antennae disc-shaped, and the claws deeply cleft at their tips. The cleft claws, indeed, distinguish this insect from any of the other species of the genus at present known.

Pterobosca aërobates sp. n.

A very dark brown species generally similar to the preceding species, but with distinct bare areas along the veins of the wings, and with the claws pointed, but not cleft at their tips.

♀. Length of wing, about 1·1 mm.; greatest breadth, about 0·4 mm.

Head very dark brown. Eyes bare. Palpi dark brown : third segment with shallow pit about middle, fifth tapering, lengths of last three segments about 10, 5, and 10 units respectively. Antennae (fig. 1, *d*) very dark : segments 3–9 disc-shaped, measuring from about 5 by 10 to 4 by 8 units; 10–15 elongate, 10–14 sub-equal, about 12–13 by 8 units, the last segment about 20 by 8 units, ending in a nipple-like process. The combined lengths of segments 3–9 and 10–15 about 29 and 84 units respectively. *Thorax* very dark brown. Scutellum and postscutellum very dark brown, the former bearing rather few hairs, most of which are about the middle. *Wings* unadorned, but veins enclosing radial cells rather deeply infuscated. Macrotrichia fairly numerous, but bare areas along veins clearly marked. No scales. Costa extending slightly beyond middle of wing. Venation as in the preceding species. Halteres with dark brown knobs. *Legs* (fig. 1, *e*) dark brown, well clothed with hairs, without scales. T.R. about 3·2. Fourth tarsal segment about two-thirds length of fifth; fifth dark, not delicate. Claws curved, as in *P. odonatiphila*, with tips not cleft. Empodium much as in *P. odonatiphila*. *Abdomen* dark brown (including cerci), without scales. Spermathecae two, very highly chitinised, oval, sub-equal, about 60 μ by 45 μ, the duct chitinised for only a short distance, about 3 μ.

Assam : Shillong, Khasi Hills, n.d., 1 ♀. Found attached to the base of the left hind-wing of a male specimen of *Idionyx* sp. ? *intricata* Fraser.

This insect may be distinguished from the preceding species, and also from two other similar species found on the wings of dragonflies, namely, *P. odonatiphila* (New Guinea), and *P. ariel* (Moluccas), by the characters of the basal segments of the antennae, the fourth tarsal segments, and the claws. The basal segments of the antennae are disc-shaped as in the preceding species, and as in *P. ariel*, but not as in *P. odonatiphila*; but the claws are not cleft as in the preceding species, and the fourth tarsal segments are not very short as in *P. ariel*. In *P. ariel*, moreover, the second radial cell of the wing is almost obliterated, slit-like.